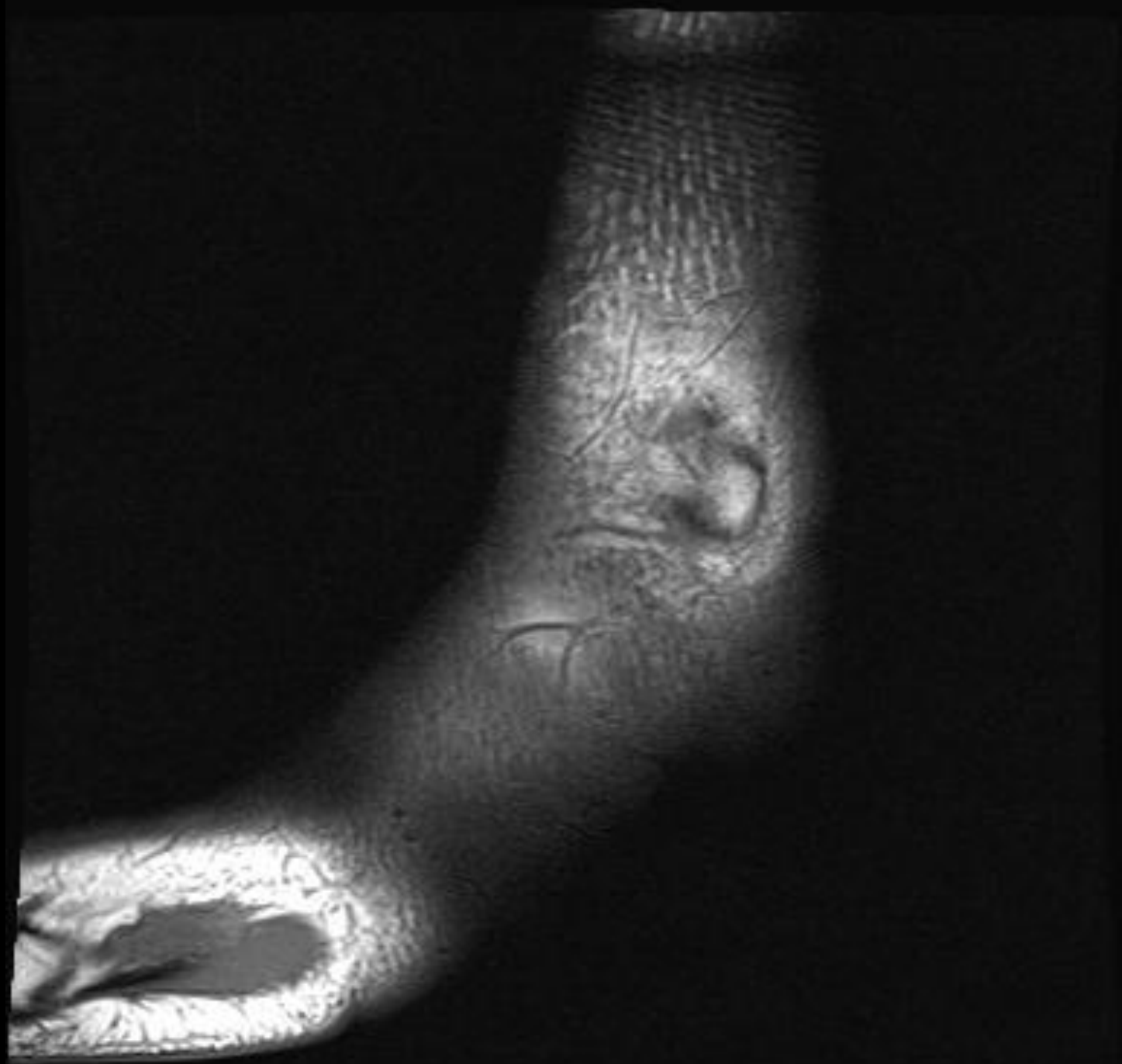




15 year old female with medial
ankle pain after a fall.









































Comparison



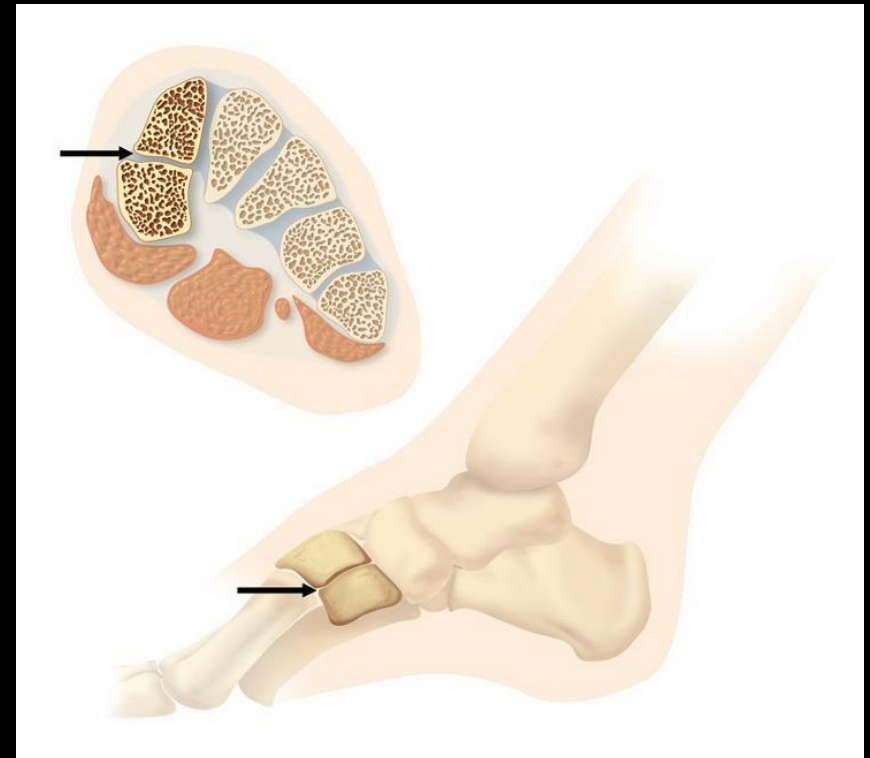
Normal



Our Case

Bipartite Medial Cuneiform

- Also known as *os cuneiforme I bipartitum*
- Made up of dorsal and plantar segments (os cuneiforme I dorsale and os cuneiforme I plantare)
- Cuneiform comes from the Latin *cuneus* (wedge) and *forma* (likeness) – “wedge-like”
- Earliest known report by Morel (1757), but other contenders for first include Smith (1866) and Barlow (1942)



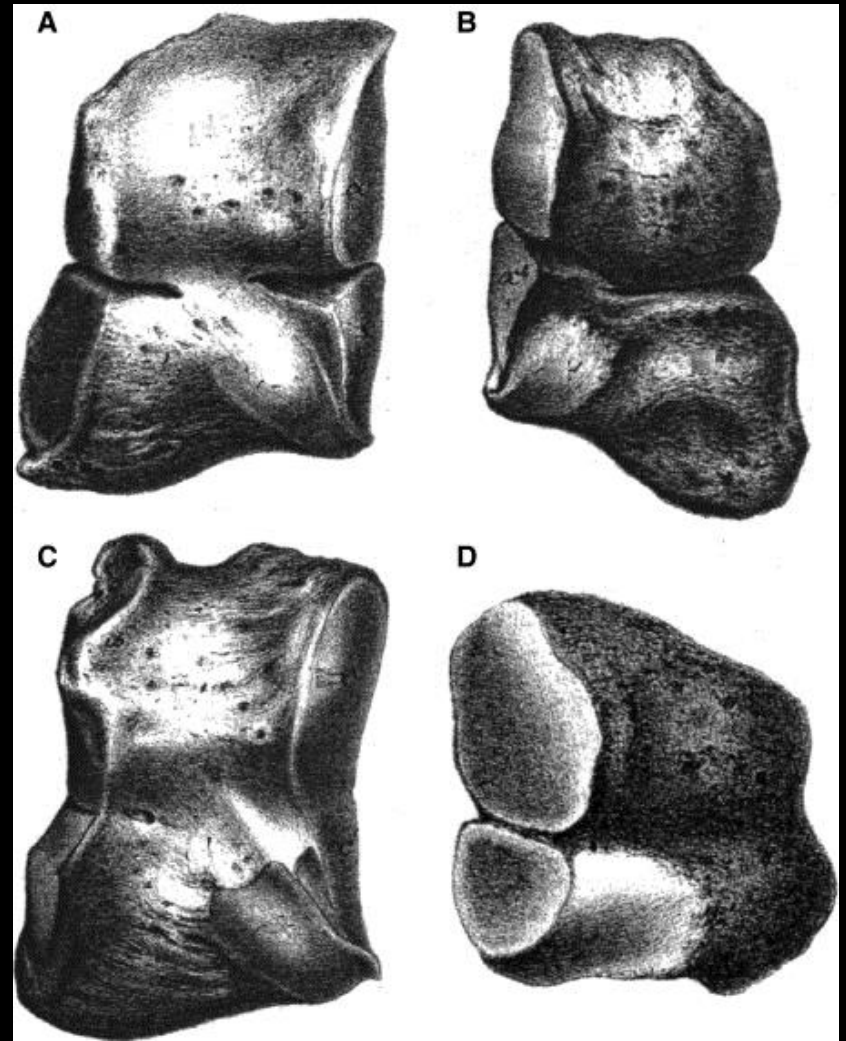
Bipartite Medial Cuneiform

- Incidence is roughly 0.3% (ranges from 0.1 – 2.4%)
- A lateral radiograph may give an "E" sign (Elias 2008)
- Typically asymptomatic and an incidental finding
- Bias towards males (as high as 87.5% of cases in an archeological meta-analysis). Possibly size related?
- Frequently bilateral (between 65.2% and 81.8% in archeological literature)
- Higher frequency in other populations?



Bipartite Medial Cuneiform

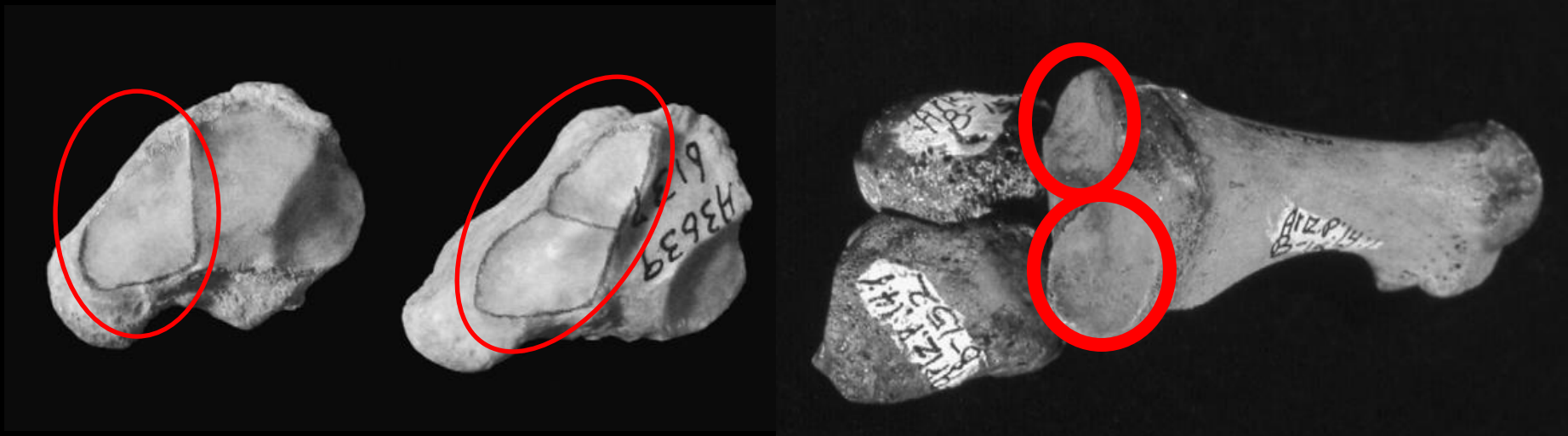
- May be arthrodial, synchondrosis, syndesmosis, or some combination
- Segments can be similar size or dorsal segment may be smaller
- Bipartition results in increases of **5–8 mm in the vertical height** of the anterior and posterior facets of bipartite medial cuneiforms equivalent to *14–23% in adult American males*
- Base of the 1st MT is also enlarged with a “figure 8”



Variable Bipartition



Facets



Development

- Cuneiforms develop by endochondral bone formation
- Medial cuneiform ossification center typically appears between one and four years of age
- Reaches adult morphology by approximately 6 years
- Unipartite, bipartite, and multicentric ossification of the medial cuneiform can all be normal developmental findings



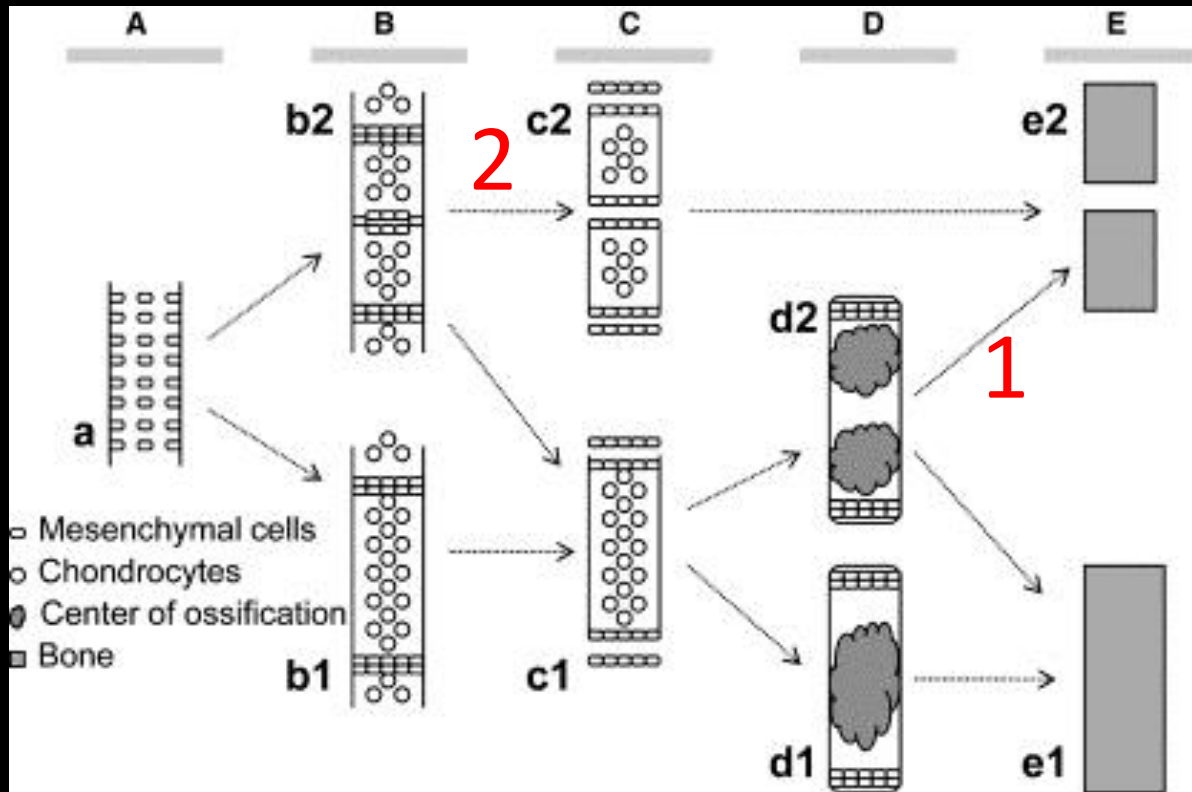
2 year old male foot.

Variant Development

Two primary hypotheses:

1. "The first proposes the existence of a single cartilaginous template for the medial cuneiform with two ossification centers, one dorsal and the other plantar, which fail to meet in the middle of the bone. This model suggests that bipartition is the result of incomplete ossification."

2. "The second hypothesis postulates the existence of two distinct portions of the cartilaginous anlage for the medial cuneiform with subsequent ossification proceeding from a separate center for each portion. Tenets of this hypothesis hold that bipartition of the medial cuneiform is the result of abnormal organization or cavitation of the primordial mesenchyme."

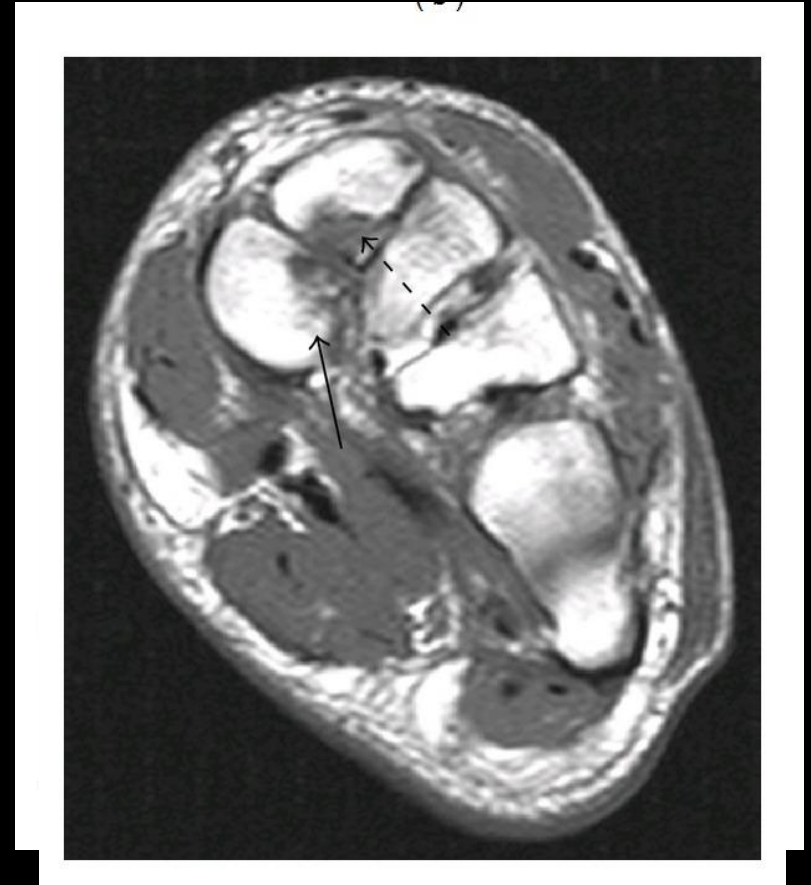
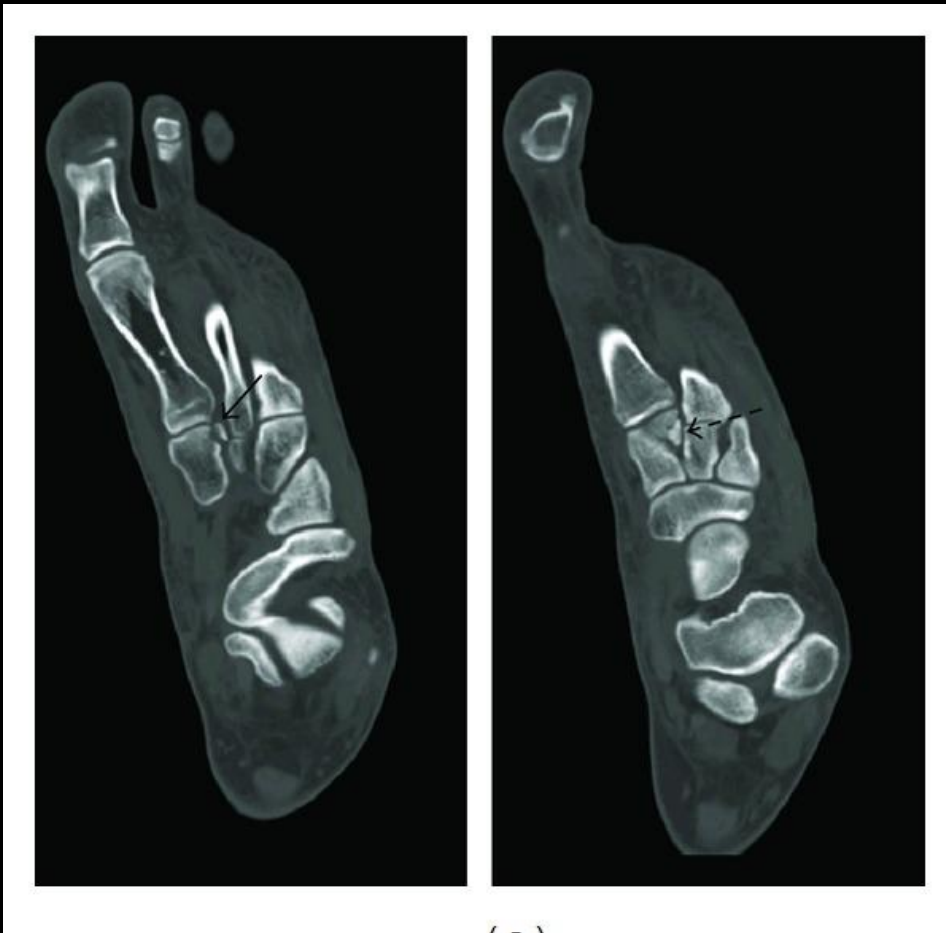


Bipartite Medial Cuneiform

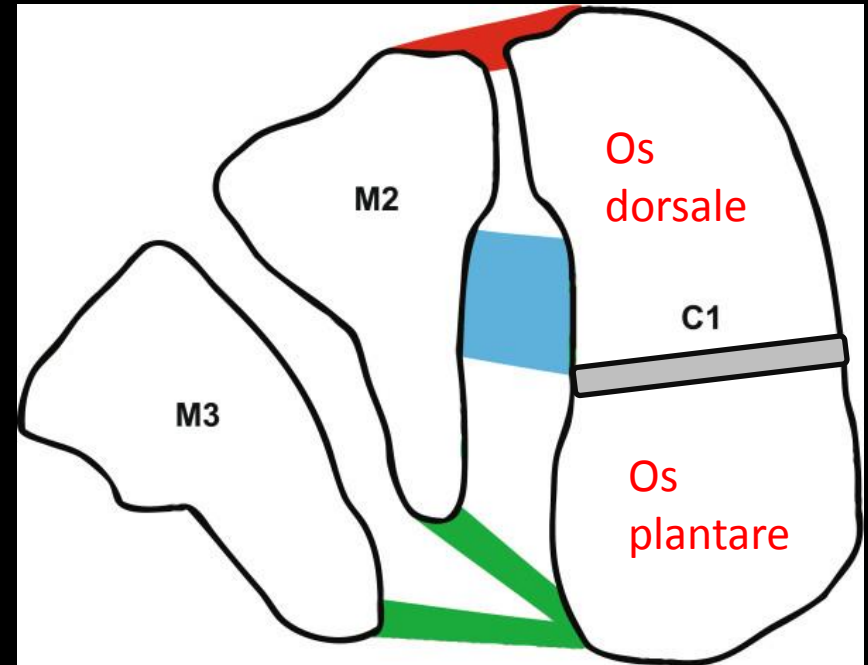
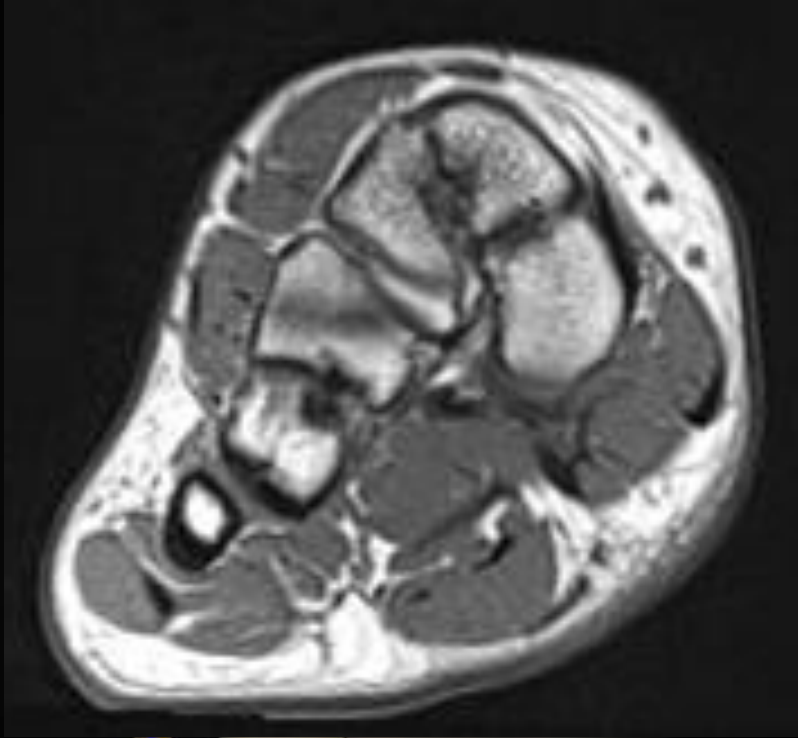
Associations may include:

- Os intermetatarsum
- Accessory navicular bone
- Spinal segmentation anomalies
- Lunotriquetral coalition
- An accessory temporal bone suture
- Bipartite temporal bone

Fractures



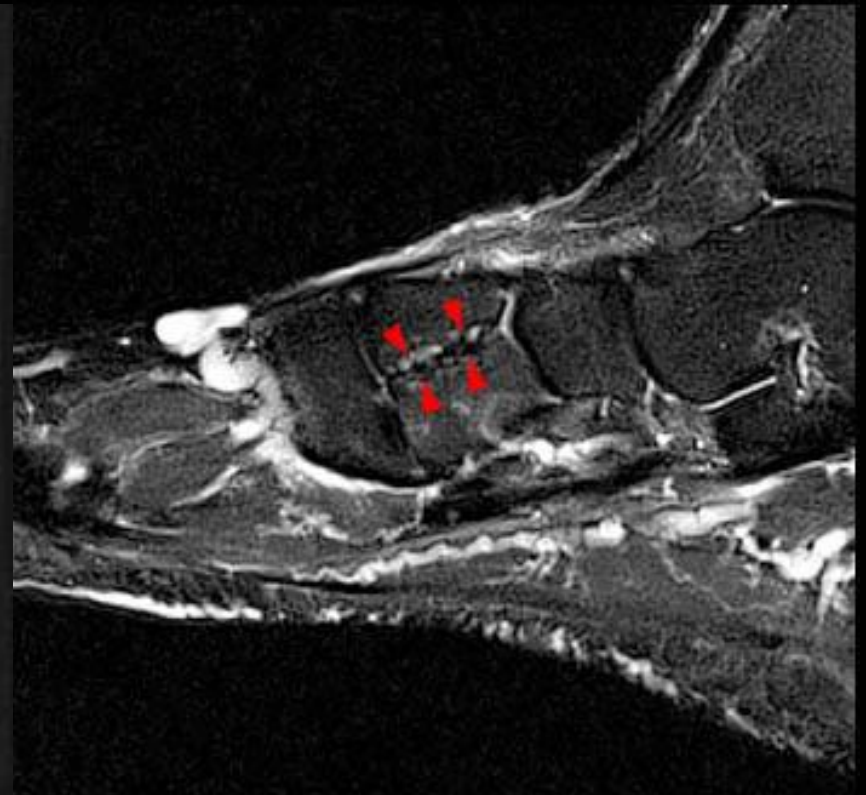
Ligaments and Tendons



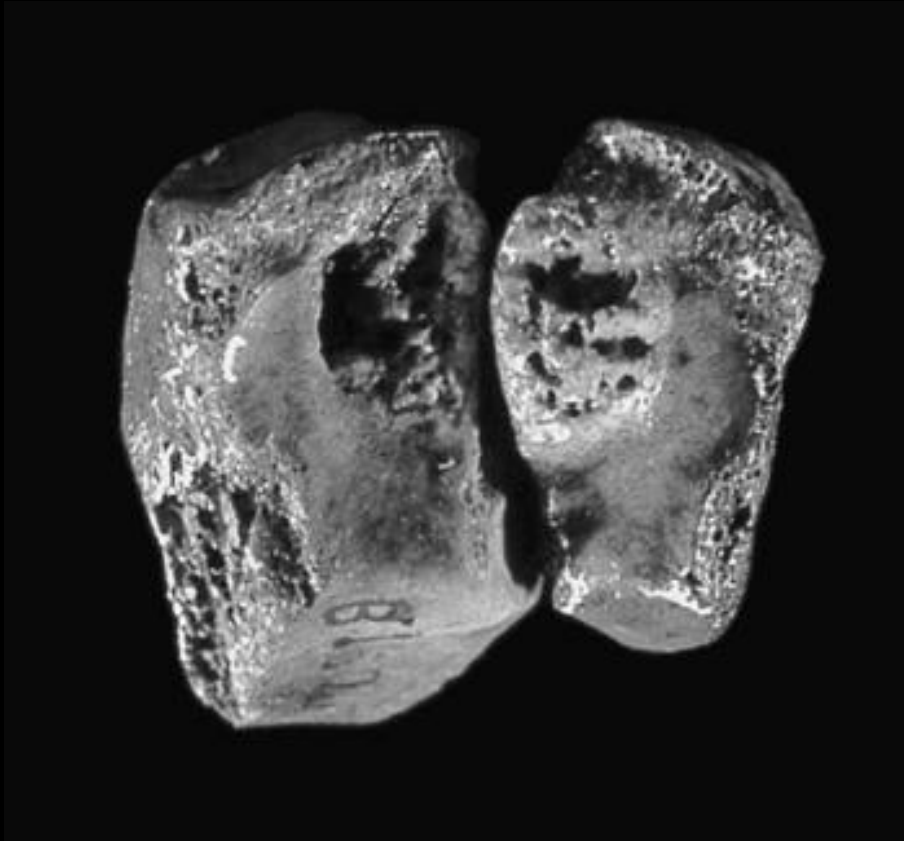
Degeneration



Non-Osseus Coalition

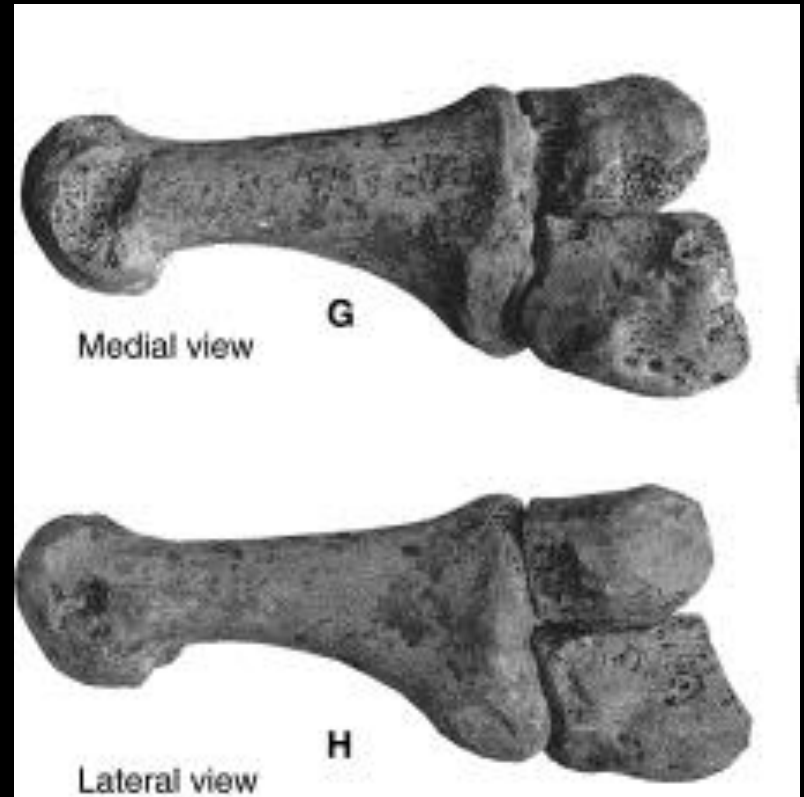


Non-Osseus Coalition



Pleistocene Hominin

- Oldest example found in a hominin fossil at Dmanisi (Georgian archeological site dating back to about **1.8 million years**)



Frequency of Bipartition in the Past?

- “An ‘8-shaped’ articular contour of the proximal first metatarsal has a low frequency in modern humans (2%) and this condition is always associated with a medial cuneiform exhibiting some degree of bipartition.”
- “If we assume that a double-faceted proximal metatarsal joint surface is indicative of bipartition of the medial cuneiform in any of the three categories, it appears that this condition was relatively frequent in Plio-Pleistocene hominins compared with modern human populations.”



References

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